COMMONWEALTH OF AUSTRALIA

Copyright Regulations 1969

Warning

CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 2, 2016

FINAL EXAMINATION	**DURATION**
HIT274 – Network Engineering Applications	Reading Time: **10** minutes Writing Time: **180** minutes

INSTRUCTIONS TO CANDIDATES

The examination has **3** sections

Section A: Suggested Time:	**Multiple Choice Questions**: Answer ALL questions 45 minutes (30 marks)
Section B: Suggested Time:	**Short Answer Questions**: Answer ALL questions 95 minutes (50 marks)
Section B: Suggested Time:	**Case Study**: Answer ALL questions 40 minutes (20 marks)

Questions in section A must be answered directly onto the Examination Paper. Section B and C are to be answered in the booklets provided.

Note that questions **ARE NOT** of equal value.

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a CLOSED BOOK examination

No calculators are permitted

No handwritten notes are permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	1 x 16 Page Book 1 x Scrap Paper

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

Section A

Multiple Choice Questions

Total No of Marks for this section: 30

This section should be answered directly into this booklet by placing an **X** next to your chosen answers. Please ensure that your name and student number have been written on this booklet.

Each question is worth 1 mark.

Suggested Time allocation for Section A: 45 mins

Section B

Short Answer Questions

Total No of Marks for this section: 50

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated.

Suggested Time allocation for Section B: 95 mins

Question 1

Complete the table below:

	Full IPv6	**Abbreviated IPv6**
a	FE80:0000:0000:0400:0000:0000:0000:054A	
b		4:B200:80:F0A:5000:C:885:A000
c	0C00:00B8:2001:0000:0000:0000:0000:0DB8	

(3 marks)

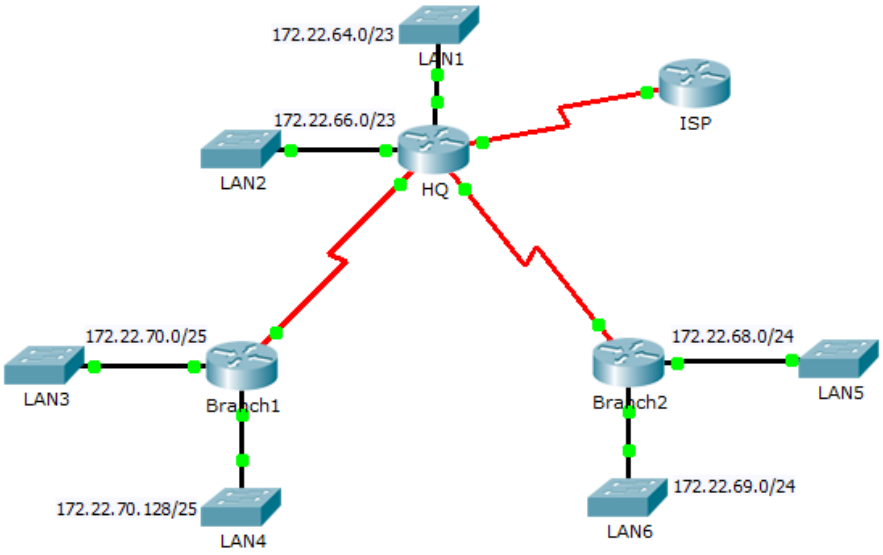
Question 2

Complete the table below

	Address / length	**Prefix**
a	4EDF:400:0:50A:FACE:BAFF:FE00:0/96	
b	D001:F0:E:D3F2:FACE:BAFF:FE00:0/72	
c	D234::CAFE:F0A0:BAFF:FE00:0/62	

(3 marks)

Question 3



a. What is the summary route to reach HQ LANs?

b. What is the summary route to reach Branch1 LANs?

c. What is the summary route to reach Branch2 LANs?

d. What is the summary route from the ISP router to reach all LANs?

(8 marks)

Question 4

Given the IP address of 138.152.192.0/22, allocate IP address to the following groups using VLSM.

- Group A: 600 users
- Group B: 400 users
- Group C: 200 users
- Group D: 50 users
- Group E: 4 users

Answer the following questions:

a. What is the last usable host address and subnet mask (in dotted decimal notation) of group A?

b. What is the first usable host address and subnet mask (in dotted decimal notation) of group C?

c. What is the broadcast address and subnet mask (in dotted decimal notation) of group D?

d. How many unallocated addresses are there?

(8 marks)

Question 5

When do you use static routing?

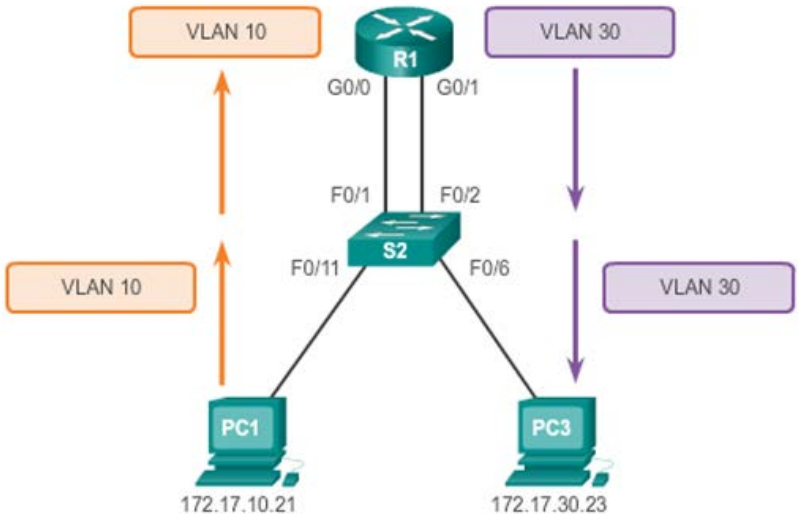
(3 marks)

Question 6

Write down two advantages and two disadvantages of static routing.

(4 marks)

Question 7



The legacy inter-VLAN routing is shown. Answer the following questions:

a. What are the disadvantages of such a setup?

b. What is a better alternative? Draw diagram to illustrate.

c. What additional configurations are needed for such alternative setup?

(6 marks)

Question 8

State why it is a good practice to configure passive interfaces

(3 marks)

Question 9

Explain the use of the following commands:

a. switchport port-security
b. switchport port-security maximum

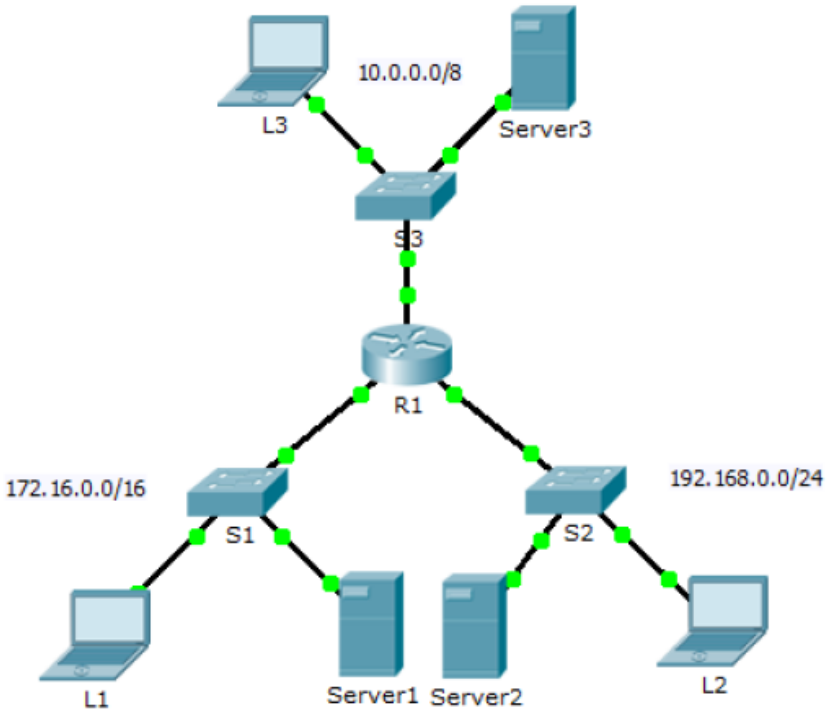
(2 marks)

Question 10

Compare the differences between NAT and PAT.

(4 marks)

Question 11



This network is meant to have the following three policies implemented:

- Hosts from the 192.168.0.0/24 network are unable to access any TCP service of **Server3** but should not be otherwise restricted
- Hosts from the 10.0.0.0/8 network are unable to access the HTTP service of **Server1** but should not be otherwise restricted
- Hosts from the 172.16.0.0/16 network are unable to access the FTP service of **Server2** but should not be otherwise restricted

Part of the running configuration for R1 is shown.

```
interface GigabitEthernet0/0
 ip address 10.0.0.1 255.0.0.0
 ip access-group 10_to_172 out
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 172.16.0.1 255.255.0.0
 ip access-group 172_to_192 in
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 ip address 192.168.0.1 255.255.255.0
 ip access-group 192_to_10 in
 duplex auto
 speed auto
```

```
ip access-list extended 10_to_172
 deny tcp 10.0.0.0 0.255.255.255 host 172.16.255.254 eq www
 permit ip any any
ip access-list extended 172_to_192
 permit ip any any
 deny tcp 172.16.0.0 0.0.255.255 host 192.168.0.254 eq ftp
ip access-list extended 192_to_10
 deny tcp 192.168.0.0 0.0.0.255 host 10.255.255.254
```

Can you state the problems with the given configurations and suggest what can be done to rectify the problems?

(6 marks)

Section C

Case Study

Total Number of Marks for this section: 20

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated.

Suggested Time allocation for Section C: 40 mins

A topology is set up with some information given below:

- The "show ip route" information for router 2 and router 3 are given.
- There are only 3 routers in this topology.
- IP addresses of some devices in the topology are also given

Router 2

```
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 5 subnets, 3 masks
O       172.16.1.0/24 [110/2] via 172.16.3.1, 00:03:45, Serial0/0/0
C       172.16.2.0/24 is directly connected, GigabitEthernet0/0
L       172.16.2.1/32 is directly connected, GigabitEthernet0/0
C       172.16.3.0/30 is directly connected, Serial0/0/0
L       172.16.3.2/32 is directly connected, Serial0/0/0
O    192.168.1.0/24 [110/65] via 192.168.10.10, 00:07:55, Serial0/0/1
     192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
O       192.168.10.4/30 [110/65] via 172.16.3.1, 00:03:45, Serial0/0/0
                        [110/65] via 192.168.10.10, 00:03:45, Serial0/0/1
C       192.168.10.8/30 is directly connected, Serial0/0/1
L       192.168.10.9/32 is directly connected, Serial0/0/1
```

Router 3

```
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 3 subnets, 2 masks
O       172.16.1.0/24 [110/2] via 192.168.10.5, 00:00:54, Serial0/0/0
O       172.16.2.0/24 [110/3] via 192.168.10.5, 00:00:54, Serial0/0/0
O       172.16.3.0/30 [110/2] via 192.168.10.5, 00:00:54, Serial0/0/0
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
     192.168.10.0/24 is variably subnetted, 4 subnets, 2 masks
C       192.168.10.4/30 is directly connected, Serial0/0/0
L       192.168.10.6/32 is directly connected, Serial0/0/0
C       192.168.10.8/30 is directly connected, Serial0/0/1
L       192.168.10.10/32 is directly connected, Serial0/0/1
```

The information about some of the devices is shown in the table below:

Device	Interface	IP Address	Subnet Mask	Default Gateway
Router 1	G0/0			N/A
	S0/0/0	172.16.3.1		N/A
	S0/0/1	192.168.10.5		N/A
Router 2	G0/0	172.16.2.1	255.255.255.0	N/A
	S0/0/0			N/A
	S0/0/1	192.168.10.9		N/A
Router 3	G0/0	192.168.1.1	255.255.255.0	N/A
	S0/0/0	192.168.10.6		N/A
	S0/0/1			N/A
PC1	NIC		255.255.255.0	172.16.1.1
PC2	NIC		255.255.255.0	
PC3	NIC	192.168.1.2	255.255.255.0	

1. Based on all the given information, draw the topology of the setup, clearly identifying the LANs, the type of cable used and the connections between the routers. The IP address and the prefix for each network are to be shown clearly in the diagram.

(8 marks)

2. Complete the given table above.

(7 marks)

3. What would be the path taken by a ping from
    a. PC 1 to PC 3? Would it be different if RIP was configured instead?
    b. PC 2 to PC 3? Would it be different if RIP was configured instead?

(5 marks)